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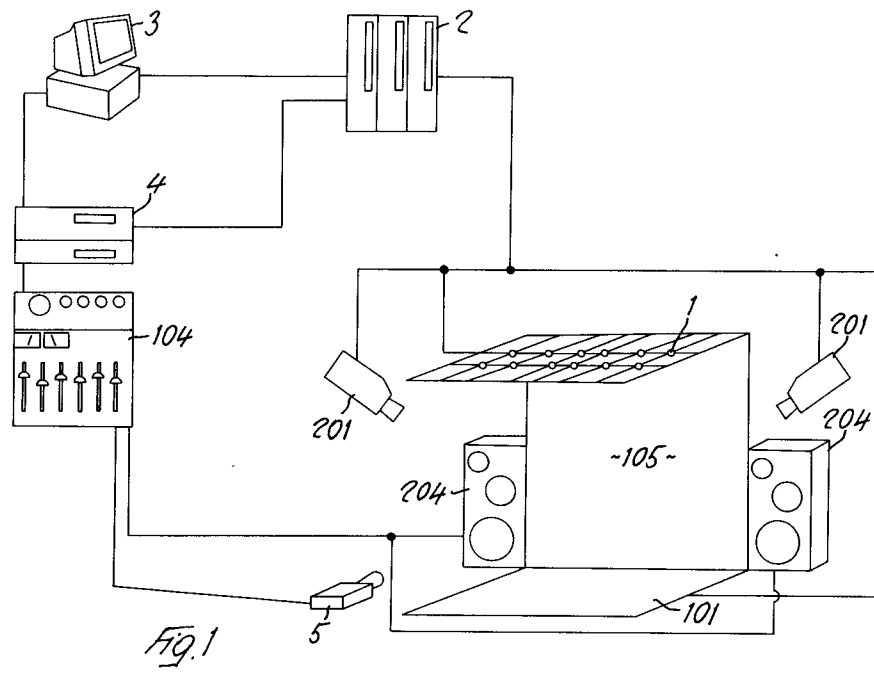
(54) **Multimedia system for the control and generation of music and animation in real time.**

(57) Multimedia system for the control and generation of music and two- and three-dimensional animation in real time, comprising: sensor means (1, 201, 101) for movement detection; a unit (2, 3) for the

acquisition and processing of data detected by the said sensors; and one or more sound generation units (4), and/or image generation and/or control units (5), and/or light effects control units (6), con-

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trolled by the said data processing unit (2, 3).



The present invention relates to a multimedia system for the control and generation of music and two- and three-dimensional animation in real time, controlled by movement detectors.

Various types of computerized electronic systems for generating and controlling sounds and images are known at present, as are such systems applied to the control of light effects, particularly for controlling discotheque equipment or for concert stage design. All these known systems are controlled by programs which, although they can be randomized, have no relation to the movements of one or more subjects on the stage.

The present invention is intended to permit direct interaction between the movement executed by a subject on a "stage" and a set of sound, light and animation effects obtainable in real time.

The subject of the present invention is therefore a multimedia system for the control and generation of music and two- and three-dimensional animation in real time, comprising: sensor means for movement detection; a unit for the acquisition and pre-processing of data detected by the said sensors; a unit for processing the acquired data, and one or more sound generation, and/or image generation and/or control, and/or light effects control units, controlled by the said data processing unit.

The sound generation unit and the systems for image generation and light effects may be controlled directly by the acquisition and pre-processing unit.

Advantageously, the said movement detection sensors may be thermal, electromagnetic, mechanical, infrared, ultrasonic or laser sensors, or an image acquisition system, singly or in combination with each other.

Further advantages and characteristics of the present invention will be more clearly understood from the following detailed description of some preferred embodiments of the invention, shown by way of non-limiting example in the accompanying drawings, in which:

Figure 1 is a schematic representation of the components of the system according to the present invention;

Figure 2 is a block diagram of a first embodiment of the system according to the present invention.

Figure 3 is a block diagram of a second, simplified embodiment of the system according to the invention, and

Figure 4 is a block diagram of a third embodiment of the system according to the invention.

With reference to the drawings, Figure 1 shows schematically the components used in one embodiment of the system of the invention. The number 1 indicates the sensors, for example electromagnetic

sensors for movement detection, forming part of a network of sensors disposed on the ceiling of a room whose floor is delimited by the platform 101. The platform 101 and any lateral walls or supports (not shown in the figure) may also be provided with sensors, for example mechanical sensors (not shown). Further means for movement detection and image acquisition, in the form of one or more video cameras 201, may also be provided. All these movement detection means are connected to a unit 2 for acquisition and pre-processing of the detected data. The unit 2 is connected to a processing unit 3, for example a computer having a suitable configuration, which in turn is connected to the peripherals 4 and 5, which are, respectively, the sound generation unit 4 and the image generation system 5 which projects the image produced by it on a screen 105. The sound generation unit 4 is connected to a mixing and amplification panel 104 to which loudspeakers 204 are connected.

The operation of the system of Figure 1 is shown schematically in the block diagram of Fig. 2. The movement detector means 1 (mechanical sensors of the platform 101, electromagnetic sensors 1 and video cameras 201) detect the movement of a subject inside the space covered by them. The said signals from the sensors 1, 101 and video cameras 201 are then acquired and pre-processed by the unit 2. The level of pre-processing of this unit 2 depends essentially on its type of configuration. The unit may consist of an I/O card, a so-called "custom" card designed ad hoc, or PLCs (programmable logic controllers). In the first case, its processing capacities will be relatively limited, while in the last case the unit 2 may also be capable of controlling the peripherals of the system when these have suitable characteristics.

The data acquired in the unit 2 are then transferred to the processing unit 3, which commonly consists of a computer with a suitable configuration, in which the said data are processed by suitable software. By the use of the data processed in this way, the unit 3 is able to control the functions of the peripherals 4, 5 and 6 which are, respectively, the sound generation unit, the image generation and/or control system, and the light effects control system (not shown in Fig. 1). The three units, which may operate in a way co-ordinated by the unit 3, are however completely independent of each other.

The sound generated by the sound generation unit 4, in the present case a synthesizer, is then mixed and amplified by the panel 104 and sent to the loudspeakers 204. The images are similarly generated by the image generation or control system 5 and projected by it onto the screen 5.

In Figure 3 the block diagram of a simplified device is shown, which must be able to operate

without a PC. In the following description, for the same or corresponding elements or parts, the same reference numerals as used in connection with the description of the embodiment shown in Figures 1 and 2 will be used.

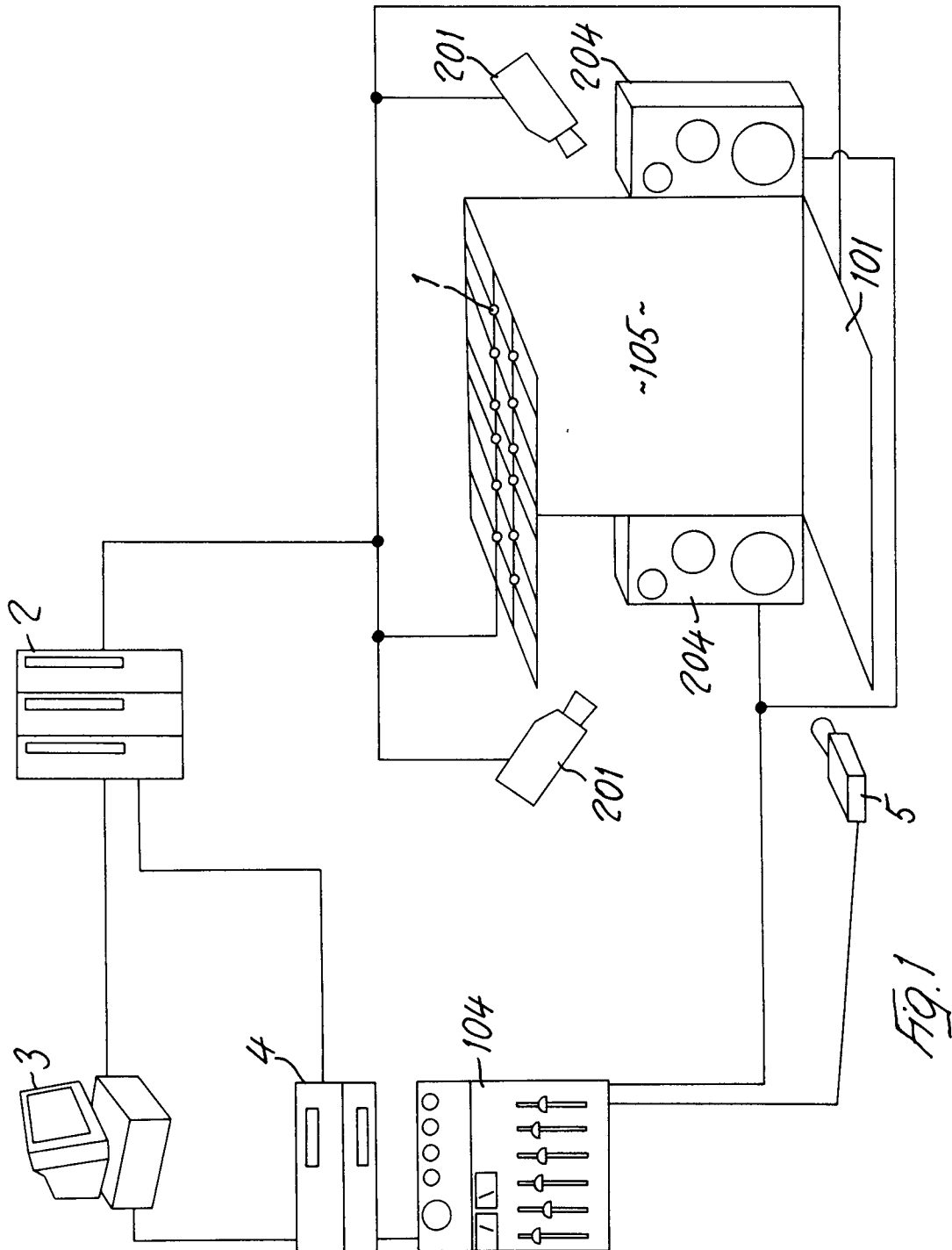
The sensor 1 that seems to be most suitable for this simplified version of the device of the invention is a foot sensor in the form of a sort of carpet, or an active infra red sensor. The sampling, processing and sound generation units 2, 2' and 4 are advantageously formed in an integrated single board ISB, as a "stand-alone" unit able to produce sound (sent to the home stereo system 204) and programmable by cartridges (not shown) like any other video game unit.

The said embodiment of the invention may be produced at a very low price, is easy to mount, easy to use and easy to "take away": it is a game for children, a simple "sound cage" for teenager and an effective gymn-aid for the whole family.

In figure 4 a third embodiment of the invention is shown, which is also apt for "audiogames". The device according to this embodiment is provided with a large number of sensors, like fine motion sensors 1', trajectories followers 1'' and sound/voice analysis 1'''. These sensors will integrate the sensor system 1 (active infrared and pressure). Also this system is provided with sampling, preprocessing, supervision and sound generation units 2, 2', 3 and 4 respectively.

Claims

1. Multimedia system for the control and generation of music and two- and three-dimensional animation in real time, characterized by the fact that it comprises, in combination,: sensor means (1, 201, 101) for movement detection; a unit (2, 3) for the acquisition and processing of data detected by the said sensors; and one or more sound generation (4), and/or image generation and/or control (5), and/or light effects control (6) units, controlled by the said data processing unit (2, 3).
2. System according to Claim 1, in which the said data acquisition and processing unit (2, 3) comprises a unit (2) for the acquisition and pre-processing of data and a final processing unit (3).
3. System according to Claims 1 or 2, in which the sound generation unit (4), and/or the image generation and/or control system (5), and/or the light effects control system (6) are controlled by the final processing unit (3) with the intermediate operation of the data acquisition and pre-processing unit (2).
4. System according to Claims 1 or 2, in which the sound generation unit (4), and/or the image generation and/or control system (5), and/or the light effects control system (6) are controlled by the data acquisition and pre-processing unit (2).
5. System according to Claim 1, in which the said movement detection sensors (1, 101) are thermal infrared, ultrasonic, laser, electromagnetic, or mechanical sensors, or an image acquisition system (201), singly or in combination with each other.
6. System according to anyone of the preceding claims, in which the said sensors (1, 201, 101) are disposed on a ceiling, on a floor, or on lateral walls or supports.
7. Use of the system according to anyone of the preceding claims, particularly in discotheques, concerts, television shows and shows in general.



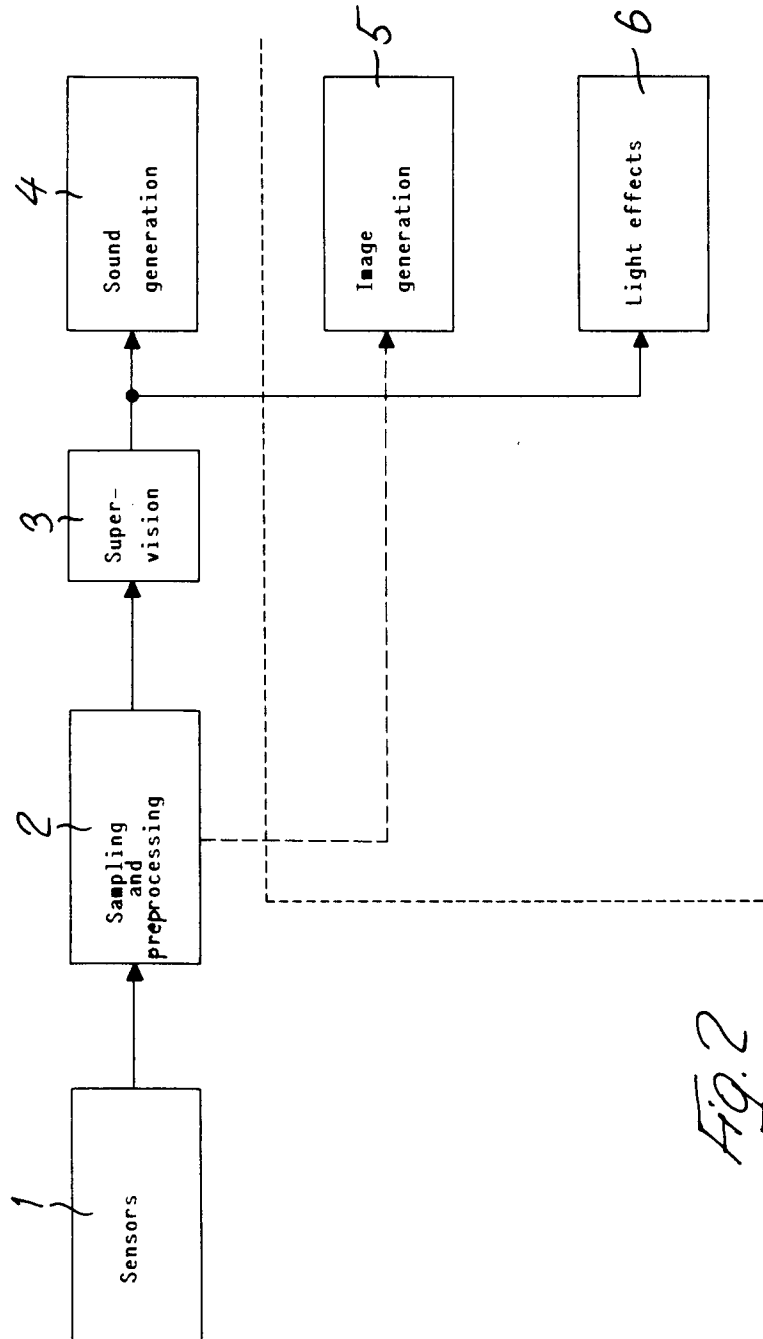


Fig. 2

